We claim:

SUB a1

1) A process for making a multilayer interference filter having substantially reduced net stress, the process comprising the steps of:

a) providing a first substrate,

b) depositing a removable multilayer interference filter having total thickness of greater than 8 microns over said first substrate,

c) removing the multilayer interference filter from the first substrate to form a free standing filter.

2) The process of claim 1 wherein the multilayer interference filter has a thickness of greater than 20 microns.

3) .The process of claim 1 wherein the multilayer interference filter has a thickness of greater than 40 microns.

4) The process of claim 1 wherein a release means is provided before depositing said removable coating.

5) The process of claim 4 wherein the release means is a release layer is selected from the group consisting of organic photoresist materials soluble in organic solvents water-soluble salts, water-soluble polymers, metals and metal compounds.

6) The process of claim 5 further comprising a step of depositing a protective layer onto said release layer.

SUB a2

7) The process of claim 4 wherein the release means is a release layer, said release layer being deposited over the first substrate in a discrete pattern whereby each free standing multilayer interference filter is released from the first substrate with lateral dimensions corresponding to the discrete pattern.

8) The process of claim 1 further comprising the removal of a portion of the multilayer interference filter in discrete patterns prior to release from said first substrate such that each free

standing multilayer interference filter is released from the first substrate with lateral dimensions corresponding to the discrete pattern.

SUB A3

9) The process of claim 1 further comprising the step of attaching the free standing multilayer interference filter to a second substrate.

10) The process of claim 8 wherein the multilayer interference filter is juxtaposed to overlay an aperture in the second substrate.

11) A process for making a multilayer interference filter having substantially reduced net stress, the process comprising the steps of:

a) providing a first substrate,

b) depositing a removable multilayer interference filter having a net stress greater than 50 MPa over said first substrate,

c) removing the multilayer interference filter from the first substrate to form a free standing filter,

d) removing the multilayer interference filter from the first substrate whereby the net stress is reduced to less than 50 % of the initial net stress.

SUB a3

12) The process of claim 11 wherein the method of depositing the removable interference filter comprises the steps of

a) introducing the first substrate into a vacuum deposition chamber,

b) reducing the pressure in said vacuum deposition chamber,

c) providing a release treatment to said first substrate,

d) depositing a protective layer onto said release treated substrate,

e) restoring the pressure in the vacuum deposition chamber,

f) reintroducing the first substrate to the vacuum deposition chamber,

g) depositing a multilayer interference filter having an initial net stress over the protective layer.

13) The process of claim 11 wherein the initial net stress is greater than 100 Mpa.

14) The process of claim 11 wherein the net stress is reduced to less than 50 Mpa.

15) The process of claim 13 wherein the net stress is reduced to less than 50 Mpa.

16) A process for forming a filter assembly, the process comprising:

a) depositing a multilayer optical filter on a substrate,

b) attaching a frame member to a discrete portion of the outer surface of the multilayer optical filter,

c) detaching the frame member and portion of the multilayer optical filter from the substrate such that the multilayer interference filter is juxtaposed to overlay an aperture defined by the frame member.

17) A multilayer optical interference filter comprising:

a) a least two optical cavities,

i) the cavities having an optical thickness that results in a passband region with a center wavelength of between 1 and 2 microns;

b) a dielectric reflector stack comprising an alternating sequence of 2 or more layer of a material with a first refractive index and a second material with a higher refractive index,

c) said filter having at least a central region that is unsupported by a substrate and substantially free of stress.

18) An optical filter assembly comprising :

a) a frame member having a first planar surface that substantially surrounds a central opening therein,

b) a multilayer interference filter having a first surface attached to the planar surface of said frame member to define an unobstructed optical aperture through said multilayer interference filter.

19) A method of separating optical communication signal channel, the method comprising:

a) providing at least one optical waveguide,

b) providing an optical element selected from the group consisting of second output waveguide, a detector, a transmitter, and an optical modular,

c) disposing between the input waveguide and the output waveguide a filter assembly, the filter assembly comprising;

i) a frame member having a first planar surface that substantially surrounds a central opening therein ,

ii) an multilayer interference filter having a first surface attached to the planar surface of said frame member to define an unobstructed optical aperture through said multilayer interference filter,

d) whereby at least one optical signal channel of a first characteristic wavelength is transmitted through the optical aperture of the filter assembly on passage between the optical waveguide and the optical element and a co-propagating optical signal is reflected by the multilayer interference filter .

20) A multilayer interference filter substantially free of residual stress having a central wavelength shift of less than 2 picometer /° C over a temperature range of about zero to 70 ° C.

21) A multilayer interference filter according to claim 20 wherein the central wavelength shift is less than 0.5 picometer /° C over a temperature range of about zero to 70 ° C.

22) An optical filter assembly comprising :

a) a frame member having a first planar surface that substantially surrounds a central opening therein,

b) a multilayer interference filter having a first surface attached to the planar surface of said frame member to define an unobstructed optical aperture through said multilayer interference filter.

23) An optical filter assembly according to claim 22 further comprising a second frame member attached to the second surface of said multilayer interference filter wherein the optical aperture through said multilayer interference filter is substantially unobstructed.

24) An optical filter assembly according to claim 22 further comprising a second frame member attached to the first frame member wherein the optical aperture through said multilayer interference filter is substantially unobstructed.

25) An optical filter assembly according to claim 22 wherein the frame member is formed of a material having a larger thermal expansion coefficient than a least one of the materials which comprise said multilayer interference filter.

26) An optical filter assembly according to claim 22 wherein the frame member is formed from a material having a coefficient of thermal expansion of greater than 20×10^{-7}/°K

27) An optical filter assembly comprising :

a) a frame member having a first planar surface that substantially surrounds a central opening therein ,

b) a multilayer interference filter having a first surface,

c) means for attaching the planar surface of said frame member to define an unobstructed optical aperture through said multilayer interference filter.

28) An optical filter assembly according to claim 27 wherein said attachment means are selected from the group consisting of adhesive bonding, soldering, brazing, optical contacting, wafer bonding, mechanical interlocking, mechanical compression, and mechanical friction.

add a4